Pattern of corrosive ingestion injuries in Port Harcourt: A ten year review

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ABSTRACT

Background: Corrosive substance ingestion is a Global health concern as it results in varied damage to the digestive tract, ranging from minor injury to strictures, and sometimes even death. In the developing world the morbidity of corrosive ingestion particularly corrosive esophageal burns remains a significant but overlooked problem. The objective of this study is to determine the pattern of corrosive ingestion as seen in University of Port-Harcourt Teaching Hospital (UPTH) over a ten year period.

Methodology: This is a retrospective descriptive study of the patients who were admitted with a history of corrosive ingestion to the department of Ear, Nose and Throat (E.N.T) surgery of UPTH over a ten year period (March 2005 to March 2010). Demographic and clinical data was obtained from the clinical records of the subjects and analyzed.

Results: Thirty cases were seen over the study period. The age range of the patients was 2-47 years old with a mean of 23.9 ± 13.4 years. Among adults there was a high incidence in the third decade while in children there was a high incidence among the under five. The most common type of corrosive ingested was caustic soda in 40% of cases. The commonest complication was esophageal stricture (40%). Fifty percent of cases were due to suicide attempt, while 9 (30%) cases were accidental ingestion of which all were children. The commonest clinical presentation was odynophagia (30%) while mortality accounted for 10% 0f cases.

Conclusion: Corrosive injury is still a major surgical emergency in our society which carries a major risk of several complications (mainly esophageal stricture). There is a need for preventive measures to avoid accidental ingestion especially in children.

Keywords: Corrosive ingestion, esophageal strictures

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INTRODUCTION

In developing countries, corrosive substance ingestion has been recognized as one of the major health problems [1]. It remains a significant medical and social concern despite various efforts to minimize its hazards [1]. Acidic or alkaline substances have been identified as common agents in corrosive ingestion [2-4]. The ingestion of a corrosive substance can produce severe injury to the gastrointestinal tract and can even result in death [3]. The degree and extent of damage depends on several factors like the type of substance, the morphologic form of the agent, the quantity, contact duration and the intent [3].

Alkali substances produce liquefaction necrosis, resultantly when 30% sodium hydroxide comes in contact with the esophagus for 1 second, it can produce a full thickness injury [3]. Sometimes thrombosis of small vessels and production of heat exacerbate the initial corrosive injury which progresses rapidly in the first few minutes but can continue for several hours [3]. Besides, mucosal sloughing occurs 4 to 7 days after the initial injury following which bacterial invasion, inflammatory response, and development of granulation tissue ensue [3]. Because collagen deposition may not begin until the second week, the tensile strength of the healing tissue is low during the first 3 weeks. Many people therefore advocate avoiding endoscopy between 5 to15 days after corrosive ingestion [3]. Scar retraction begins by the third week and may continue for several months. This results in stricture formation and shortening of the involved segment of the gastrointestinal tract. Shortening of the esophagus alters the lower esophageal sphincter (LES) pressure leading to increased gastro-esophageal reflux, which in turn accelerates stricture formation [6].

Furthermore, it produces changes in esophageal motility resulting in low amplitude and non peristaltic contractions [7]. The degree of injury produced depends, to some extent, on the physical form of the substance. Crystals or solid particles adhere to the mucous membrane making it difficult to swallow and thereby diminishing the injury produced to the esophagus. On the other hand, liquid substance is easily swallowed, being tasteless and odorless, and is most likely to damage the esophagus and stomach [3]. Acid induces coagulation necrosis with eschar formation which may limit tissue penetration, but this does not appear to be a major variable in determining the extent of injury. Some earlier studies[8, 9], indicated that acid preferentially damages the stomach but other studies have reported extensive damage to the esophagus as well [10]. The degree of injury correlates directly with stricture formation and mortality. Over 80% of patients with grade 3 burns go on to stricture formation while one-third of those with grade 2 burns may develop stenosis of the esophagus [3]. Stricture formation is extremely rare in injuries of the first degree.

The clinical presentation depends upon the type of the substance, amount, and physical form of the substances. Hoarseness and stridor may be seen suggesting laryngeal or epiglottic involvement. Symptoms of esophageal

involvement include dysphagia and odynophagia, whereas epigastric pain and hematemesis may be manifestations of stomach involvement [6]. However, the absence of pain does not preclude significant gastrointestinal damage. Sometimes massive hematemesis can occur as a result of an aortoenteric fistula [3]. Perforation of the stomach or the esophagus can occur at any time during the first 2 weeks [3]. Hence, any change in the clinical condition of the patient such as worsening of abdominal pain or the appearance of chest pain should be promptly investigated by radiologic studies. Injuries of the oropharynx are therefore not a reliable index of damage to esophagus [3]. Stricture formation may become symptomatic within 3 months or may even manifest a year later [3]. Symptoms of early satiety and weight loss may suggest gastric outlet obstruction. This tends to occur less frequently than stricture formation [11]. This complication may be seen within 5 or 6 weeks or may present for the first time after several years [3]. In the developing world the morbidity of corrosive ingestion particularly corrosive esophageal burns remains a significant but overlooked problem. It is on this background that this study, seeks to determine the pattern of corrosive ingestion as seen in UPTH, in order to highlight the factors responsible for the morbidity and mortality associated with this condition and to have a baseline for future comparison.

METHODOLOGY

This is a retrospective descriptive study of the patients who were admitted with a history of corrosive ingestion to UPTH over a ten year period (March 2005 to March 2010). The accident and emergency department records; ward records and theatre registers were the main source of the information. The data extracted for analysis were age, sex, presenting features, types of corrosive ingested, reasons for ingestion, general management given to the patient, investigations (chest x-rays, plain abdominal x-rays, barium studies etc) and complications and outcome following the corrosive ingestion. Simple statistical tables and pie chart were used to illustrate the data. Categorical data were expressed as mean and standard deviation. Data analysis was done using SPSS for windows 15.

RESULTS:

Prevalence of corrosive ingestion:

The total number of ear, nose and throat emergencies seen in the department over the period under review was 500; patients with corrosive ingestion injuries were 30, they therefore constituted 6% of all emergencies that were seen during the study period.

Age of Subjects:

The age range was 2-47 years with a mean of 23.9± 13.4 years. Among adults there was a high incidence in the third decade while in children there was a high incidence among the under fives (Table 1).

Gender distribution: There were 24 males and 6 females (M: F of 4:1).

Pattern of clinical Presentation: Fifteen cases (50%) were due to suicide attempt and all were adults; nine cases (30%) were accidental ingestion of which all were children. The remaining six cases (20%) were due to forceful ingestion. The commonest clinical presentation was odynophagia (30.00%) while chest pain accounted for 3.33% (Table 2). Mortality occurred in 10% of the cases.

Pattern of investigation: Plain chest x-rays and barium swallow were performed in all patients.

Pattern of corrosive ingestion: Different types of corrosives were encountered (Table 3). The most common type was caustic soda (40%) in 12 patients.

Spectrum of complications and Outcome: Forty percent (12) of the patients showed esophageal strictures while 23.3% (7) had no complications (Table 4). Two of the patients that died were adults who drank caustic soda solution deliberately for suicidal reason; the other one was a five year old child who presented to the hospital a week after she accidentally drank caustic soda solution stored in a plastic container at home.

Duration of hospitalization:

The minimum duration of patient stay in the hospital was three weeks.

Treatment modality:

All patients had intravenous infusions, analgesics, antacids, H-2 receptor blockers, antibiotics, steroids and early insertion of nasogastric tube. None had endoscopy.

Table 1: Patient age Distribution

N= 30 Age (years)	No. of cases	Percentage (%)
Under 5	5	16.67
6-11	2	6.67
12-17	2	6.67
18-23	4	13.33
24-29	3	10.00
30-35	9	30.00
36-41	3	10.00
42-47	2	6.67

Table 2: Pattern of clinical presentation

N = 30 Clinical presentations	No. of cases	Percentage (%)
Vomiting	3	10
Breathing difficulties	2	6.67
Mouth ulcers	6	20.00
Odynophagia	9	30.00
Dysphagia	5	16.67
Salivation	4	13.33
Chest pain	1	3.33

Table 3: Pattern of corrosive ingestion

Total n = 30 Corrosives	No. of cases	Percentage (%)
Caustic soda	12	40.00
Kerosene	9	30.00
Bleach	4	13.33
Acid	3	10.00
Shaving powder	2	6.67

Table 4: Pattern of Complications and outcome:

Complications	No. of cases	Percentage (%)
Esophageal stricture	12	40.00
Hypoglycaemia	6	20.00
Chemical pneumonitis	2	6.67
Nocomplications	7	23.3
Death	3	10

DISCUSSION

Corrosive ingestion is a worldwide health problem that requires adequate and prompt attention [1]. It tends to occur less frequently in developed countries but appears to be more common in developing countries where caustic soda, hydrochloric acid and sulfuric acid are easily accessible [5]. Several studies have reported a male preponderance [3, 4]. This study revealed a male to female ratio of 4:1. There is a high incidence in the third decade among adults; this is in contradistinction to a previous study that reported a high incidence in the 2nd decade [4].

Children under five years of age constituted the highest risk group among children. This study further revealed that 50% of the patient's reason for ingesting corrosives was suicidal and this was found amongst the adult patients while accidental corrosive ingestion was found only amongst children. These findings agreed with the reports of other researchers [4,12,13]. Children under five years of age have well-developed skills to locate and drink liquids, but are unable to discriminate edible liquids from toxic ones [3]. The study noted that 20% of cases were due to forceful ingestion of acid but the reason for the act was not documented. However, one could associate such an act with homicidal tendencies.

Different types of corrosives were encountered in this study; the most common type was caustic soda (40%). This finding is comparable to other reports where alkalis were the most frequently encountered [4,14,15,16]. Although, in another study the most common type was 5.25% hypochlorite (50%) while caustic soda accounted for only 12.5% [17]. In children several studies have documented that most ingestion occurred at home and in the kitchen [3,5]. Besides, high family stress, marital conflicts, deaths in the family, mental illness, and physical illness like human immune-deficiency virus infection have been identified as predisposing factors associated with ingestion of corrosives [3,5].

Barium studies, plain chest and abdominal X-rays were done for some of the patients. They were helpful as a follow-up measure and for evaluation of complications. Complications associated with ingestion of corrosives notably, esophageal strictures of short segment type were evident in 40% (12) of cases. Evidence from other studies has also shown that stricture formation following the ingestion of corrosive could be as high as 63% [14]. Sometimes, the unpleasant taste of some corrosives particularly acids can cause choking, sputtering, and vomiting which may cause chemical epiglottitis and pneumonitis [14]. There was good clinical outcome in only 23.3% of cases. Majority (66.7%) of patients had morbidity while 10% of cases had mortality, this occurred mostly on adults who ingested caustic soda with the intent to commit suicide. The type of corrosive substance ingested, its quantity, duration of contact and the intent of the patient have been documented by other researchers as poor prognostic factors of corrosive ingestion [3-4].

Plain chest radiograph did not reveal much in this study apart from features of pneumonia. However, other studies have shown that in the acute phase, a plain chest radiograph could reveal air in the mediastinum which suggests esophageal perforation. Likewise free air under the diaphragm indicated gastric perforation [18]. If it is necessary to confirm perforation, a water-soluble agent like gastrograffin should be used as they are less of an irritant to the mediastinum and peritoneal cavity compared with barium sulfate [18].

The insertion of nasogastric tube early in the course of the treatment was meant to ensure patency of the esophageal lumen but one needs to be cautious because a nasogastric tube itself can contribute to the development of long strictures [3]. The patients with esophageal strictures were referred to centers that have better facilities to continue with the already commenced expert management.

The use of flexible endoscopy has revolutionized the management of corrosive ingestion because it is a safer procedure compare to the rigid type. Unfortunately, it was not used in the assessment of the patients probably due to its unavailability. Some previous studies have suggested the preferred timing of endoscopy. It is generally recommended preferably within 12 hours and generally not later than 24 hours although some authors state that it can be safely performed up to 96 hours post-ingestion [6,9]. Endoscopy is usually avoided from 5 to 15 days after corrosive intake because wound softening begins after 2 to 3 days and lasts up to 2 weeks making it risky during this period [6]. However, it should be performed as soon as possible because it serves a dual purpose. First, patients with no evidence of gastrointestinal injury can be discharged, provided there are no other complications. Secondly, patients with evidence of severe injury can be managed appropriately [6].

CONCLUSION

Corrosive injury is still a major surgical emergency. It carries a major risk of several complications (mainly esophageal strictures) and mortality. It still remains a very significant

source of morbidity and mortality in our society. To curb the menace posed by the ingestion of corrosives, the authors recommend that groups at risk and risk factors should be identified by all and sundry. Moreover, the government should provide appropriate education, eradicate poverty and enforce regulations for manufacturers of household products. These would certainly help to reduce significantly the incidence of corrosive ingestion in our society.

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